REMARKS

Claims 1-9 and 11-54 are pending in this application. Claims 1-9 and 11-20 have been elected for prosecution on the merits, of which claims 1, 4, 5, and 6 are independent.

Allowable Subject Matter

Applicants wish to thank the Examiner for indicating that claims 2 and 3 contain allowable subject matter.

Drawings

Figures 15-17 have been objected to for not be designated by a legend such as "Prior Art". Those figures have not been labeled "Prior Art" because they are general drawings for purposes of explaining basic principles. They were not obtained from prior art documents, and do not qualify as statutory prior art. Applicants respectfully request that the corrected formal drawings be entered and that the objection to the drawings be withdrawn.

Claim Objection

Claim 6 has been objected to due to the word "includes". Accordingly, claim 6, as well as claim 3, have been corrected to recite the word "including" as requested. Applicants request that the objection be withdrawn.

Claim Rejections - 35 USC 112

Claims 18 and 19 have been rejected under 35 U.S.C. 112, first paragraph. Accordingly, claim 18 has been amended to correct typographical errors in preparing the previous amendment. Applicants respectfully request that the rejection be withdrawn.

Claims 15, 17, and 20 have been rejected under 35 U.S.C. 112, second paragraph. Accordingly, claims 15, 17, and 20 have been amended to correct typographical errors in preparing the previous amendment. Applicants respectfully request that the rejection be withdrawn.

Claim Rejection - 35 USC 102; Tanaka

Claim 1 has been rejected under 35 U.S.C. 102(b) as being anticipated by Tanaka (U.S. Patent 5,177,753). Applicants respectfully traverse this rejection.

Claim 1 is directed to a semiconductor laser device including: a semiconductor laser chip; and a resin having a light diffusion capability, wherein the resin comprises two or more materials of different refractive indexes, and wherein the semiconductor laser chip is encapsulated within the resin forming a molded lens and wherein the laser light is emitted through said molded lens. Features of the claimed invention include a semiconductor laser device that is encapsulated in a resin, wherein the resin has a light

diffusing capability so as to diffuse the intense laser light and prevent damage to the human eye, and wherein the resin forms a molded lens to focus the laser.

Tanaka discloses a semiconductor laser device (see Figures 2, 5, and 6) having a smooth, transparent resin 15 and optionally a glass plate 16 placed in front of the front cleavage face 5a of the laser chip 5, and wherein a waveguide element 18 is provided between the rear cleavage face 5b of the laser to direct laser light from the rear cleavage face to a light receiving element 7 for monitoring the laser beam. A protective resin material 20 is applied to the upper surface of the transparent resin material 15 up to the waveguide member 18.

There are several differences between Tanaka and the claimed invention. In the claimed invention, the resin that encapsulates the semiconductor laser chip has a light diffusion capability as it comprises two or more materials of different refractive indexes and forms a molded lens, wherein laser light is emitted through the molded lens. In Tanaka, the transparent resin material 15 for light emitted from the laser chip does not encapsulate the laser chip.

Rather the laser chip in Tanaka is encapsulated with three different components of different materials. The three components do not collectively form a lens. The transparent resin material 15, optionally having a curved face as in a convex lens (column 5, lines 3-9), is formed to cover the front cleavage face 5a of the laser chip (column 3, lines 15-16) and is not disclosed

as being composed of two or more materials of different refractive indexes. With respect to the limitation of "the resin comprises two or more materials of different refractive indexes," the Office Action points to the statement on column 3, lines 19-23, and a section at column 4, lines 59-66. The former section pertains to the transparent resin material 15 covering the front cleavage face 5a. The later section at column 4 pertains only to the material of the waveguide member 18 connecting the rear cleavage face 5b. Still further, the protective seal resin material 20 is not for purposes of transmitting light.

Furthermore, Tanaka teaches away from a resin having a light diffusion capability and forming a molded lens, wherein the laser light is emitted through the molded lens. Tanaka clearly states as an object to provide a semi-conductor laser unit which is superior in the beam characteristics (column 1, first paragraph under "Summary of the Invention"). As can be seen in Tanaka, the object is provided by way of a front cleavage face of the laser chip covered by a transparent resin material, with a front face of the transparent resin material being formed into a smooth face. In particular, beam characteristics can be improved because the laser chip can be directed in the normal direction of the smooth face through the smooth transparent resin member (column 5, lines 13-18). Thus, if Tanaka were to be implemented such that the transparent resin material had a light diffusing capability, the coherence

of Tanaka's semiconductor laser would be reduced (i.e., insuperior beam characteristics).

Thus, Applicants submit that Tanaka fails to teach or suggest at least the claimed semiconductor laser device of claim 1, "wherein the semiconductor laser chip is encapsulated within the resin forming a molded lens," the resin having a light diffusion capability. Accordingly, Applicants submit that Tanaka fails to teach each and every claimed element. Applicants respectfully request that the rejection be withdrawn.

Claim Rejections - 35 USC 103

Independent claim 4, as well as claims 7, 16, 17, and 20, have been rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka in view of Thornton et al. (U.S. Patent 5,386,428). Applicants respectfully traverse this rejection.

Similar to the above for claim 1, claim 4 recites, "a semiconductor laser chip encapsulated within a resin, having a light diffusion capability and forming a molded lens."

Tanaka discloses a semiconductor laser device (see Figures 2, 5, and 6) having a smooth, transparent resin 15 and optionally a glass plate 16 placed in front of the front cleavage face 5a of the laser chip 5, and wherein a waveguide element 18 is provided between the rear cleavage face 5b of the laser to direct laser light from the rear cleavage face to a light receiving element 7 for monitoring the laser beam. A protective resin material 20 is

applied to the upper surface of the transparent resin material 15 up to the waveguide member 18.

There are several differences between Tanaka and the claimed invention. In the claimed invention, the resin that encapsulates the semiconductor laser chip has a light diffusion capability and forms a molded lens. In Tanaka, the transparent resin material 15 for light emitted from the laser chip does not encapsulate the laser chip and does not have a light diffusion capability.

Rather the laser chip in Tanaka is encapsulated with three different components of different materials. The three components do not collectively form a lens. The transparent resin material 15, optionally having a curved face as in a convex lens (column 5, lines 3-9), is formed to cover the front cleavage face 5a of the laser chip (column 3, lines 15-16).

Again because the transparent resin material 15, optionally having a curved face as in a convex lens, does not encapsulate the semiconductor laser chip and does not have a light diffusion capability, Applicants submit that Tanaka fails to teach each and every element of claim 4, as well.

Furthermore, Tanaka teaches away from a resin having a light diffusion capability and forming a molded lens. Tanaka clearly states as an object to provide a semi-conductor laser unit which is superior in the beam characteristics (column 1, first paragraph under "Summary of the Invention"). As can be seen in Tanaka, the object is provided by way of a

front cleavage face of the laser chip covered by a transparent resin material, with a front face of the transparent resin material being formed into a smooth face. In particular, beam characteristics can be improved because the laser chip can be directed in the normal direction of the smooth face through the smooth transparent resin member (column 5, lines 13-18). Thus, if Tanaka were to be implemented such that the transparent resin material had a light diffusing capability, the coherence of Tanaka's semiconductor laser would be reduced (i.e., insuperior beam characteristics).

Thornton discloses a stacked active laser array that outputs multicolor laser beams. Unlike Thornton, Tanaka discloses a laser unit that projects a laser beam from a front cleavage face and receives a laser beam at a rear cleavage face, where the rear cleavage face is connected by a waveguide member 18. Thus, Applicants submit that there is insufficient disclosure to enable the combination of Tanaka and Thornton. In any case, Thornton also fails to teach or suggest a semiconductor laser encapsulated within a resin, having a light diffusion capability and forming a molded lens.

Furthermore, an aspect of the present invention is to reduce light density so that laser light emitted from the laser chip via the molded resin is safe for human vision. Applicants have found that by incorporating a semiconductor laser having a plurality of light emitting portions, not only is light density reduced, but also the resistance of the

semiconductor laser is reduced, leading to a lower required driving voltage and an improvement in the reliability of the device (specification, page 22, lines 12-18). Applicants submit that such a result would not have been expected given the teachings of Thornton. At least for this reason, Applicants submit that the present invention produces an unexpected result.

Accordingly, the rejection fails to establish *prima facie* obviousness for claims 4, 7, 16, 17, and 20. Applicants respectfully request that the rejection be withdrawn.

Claim Rejection - 35 USC 103

Claims 4 and 7 have also been rejected under 35 U.S.C. 103(a) based on Tanaka in view of Claisse et al. (Electronics Letters, previously applied). Applicants respectfully traverse this rejection.

The same arguments as in the above for claim 4, apply as well to this rejection. Again because the transparent resin material 15, optionally having a curved face as in a convex lens, does not encapsulate the semiconductor laser chip and does not have a light diffusion capability, Applicants submit that Tanaka fails to teach each and every element of claim 4, as well.

The Office Action relies on Claisse for teaching a plurality of light emitting portions, admitted as missing from Tanaka. Further, Claisse is relied on for teaching an improvement in internal quantum efficiency of

multiple quantum wells over single quantum wells in semiconductor laser chips (Claisse: Figure 2). That teaching is used as a basis for a motivation to combine Claisse with Tanaka.

Claisse is directed to principles of quantum efficiency in laser diodes. Near the end of the article, it mentions that the use of multiquantum well has resulted in an improvement in values of internal quantum efficiency for short cavity lasers. Claisse does not actually disclose a specific semiconductor laser device and does not teach a diffused light capability for purposes of safe laser light emission.

Thus, Applicants submit that Claisse does not at least make up for the deficiencies in Tanaka. Therefore, the rejection fails to establish *prima facie* obviousness.

Claim Rejection – 35 USC 103

Independent Claim 5, as well as claim 8, have been rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka in view of Hirayama et al. (U.S. Patent 5,970,081, previously applied).

Claim 5 is directed to a semiconductor laser device including a semiconductor laser chip encapsulated within resin, having a light diffusion capability and forming a molded lens, wherein the semiconductor laser chip includes at least one light emitting portion having a width of about 7 μm or more.

Tanaka discloses a semiconductor laser device (see Figures 2, 5, and 6) having a smooth, transparent resin 15 and optionally a glass plate 16 placed in front of the front cleavage face 5a of the laser chip 5, and wherein a waveguide element 18 is provided between the rear cleavage face 5b of the laser to direct laser light from the rear cleavage face to a light receiving element 7 for monitoring the laser beam. A protective resin material 20 is applied to the upper surface of the transparent resin material 15 up to the waveguide member 18.

There are several differences between Tanaka and the claimed invention. In the claimed invention, the resin that encapsulates the semiconductor laser chip has a light diffusion capability and forms a molded lens. In Tanaka, the transparent resin material 15 for light emitted from the laser chip does not encapsulate the laser chip and does not have a light diffusion capability.

Rather the laser chip in Tanaka is encapsulated with three different components of different materials. The three components do not collectively form a lens. The transparent resin material 15, optionally having a curved face as in a convex lens (column 5, lines 3-9), is formed to cover the front cleavage face 5a of the laser chip (column 3, lines 15-16).

Because the transparent resin material 15, optionally having a curved face as in a convex lens, does not encapsulate the semiconductor laser chip and does not have a light diffusion capability, Applicants

submit that Tanaka fails to teach each and every element of claim 5, as well.

Furthermore, Tanaka teaches away from a resin having a light diffusion capability and forming a molded lens. Tanaka clearly states as an object to provide a semi-conductor laser unit which is superior in the beam characteristics (column 1, first paragraph under "Summary of the Invention"). As can be seen in Tanaka, the object is provided by way of a front cleavage face of the laser chip covered by a transparent resin material, with a front face of the transparent resin material being formed into a smooth face. In particular, beam characteristics can be improved because the laser chip can be directed in the normal direction of the smooth face through the smooth transparent resin member (column 5, lines 13-18). Thus, if Tanaka were to be implemented such that the transparent resin material had a light diffusing capability, the coherence of Tanaka's semiconductor laser would be reduced (i.e., insuperior beam characteristics).

Hirayama is directed to a grating coupled surface emitting device for outputting light by a diffraction grating. The emitting device is capable of attaining substantially ideal emission pattern of radiation-mode light, and increasing the coupling efficiency with an optical fiber (column 2, lines 26-31). Hirayama discloses an embodiment capable of emitting a light pattern having a spot size of 18 μm (column 6, lines 48-50). Because the large spot size is for purposes of coupling with an

optical fiber, Hirayama's large spot size is not for purposes of safety to human vision.

Thus, Hirayama does not at least make up for the deficiencies of Takama with respect to an encapsulating resin. Therefore the rejection fails to establish prima facie obviousness for claims 5 and 8. Applicants respectfully request that the rejection be withdrawn.

Claim Rejection - 35 USC 103

Independent claim 6, as well as claim 9, have been rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka in view of Andrews (U.S. Patent 5,422,905, previously applied).

Claim 6 is directed to a semiconductor laser device including a semiconductor laser chip encapsulated within resin, having a light diffusion capability and forming a molded lens further including at least one additional semiconductor laser chip.

Tanaka discloses a semiconductor laser device (see Figures 2, 5, and 6) having a smooth, transparent resin 15 and optionally a glass plate 16 placed in front of the front cleavage face 5a of the laser chip 5, and wherein a waveguide element 18 is provided between the rear cleavage face 5b of the laser to direct laser light from the rear cleavage face to a light receiving element 7 for monitoring the laser beam. A protective resin material 20 is applied to the upper surface of the transparent resin material 15 up to the waveguide member 18.

There are several differences between Tanaka and the claimed invention. In the claimed invention, the resin that encapsulates the semiconductor laser chip has a light diffusion capability and forms a molded lens. In Tanaka, the transparent resin material 15 for light emitted from the laser chip does not encapsulate the laser chip and does not have a light diffusion capability.

Rather the laser chip in Tanaka is encapsulated with three different components of different materials. The three components do not collectively form a lens. The transparent resin material 15, optionally having a curved face as in a convex lens (column 5, lines 3-9), is formed to cover the front cleavage face 5a of the laser chip (column 3, lines 15-16).

Because the transparent resin material 15, optionally having a curved face as in a convex lens, does not encapsulate the semiconductor laser chip and does not have a light diffusion capability, Applicants submit that Tanaka fails to teach each and every element of claim 6, as well.

Furthermore, Tanaka teaches away from a resin having a light diffusion capability and forming a molded lens. Tanaka clearly states as an object to provide a semi-conductor laser unit which is superior in the beam characteristics (column 1, first paragraph under "Summary of the Invention"). As can be seen in Tanaka, the object is provided by way of a front cleavage face of the laser chip covered by a transparent resin material, with a front face of the transparent resin material being formed

into a smooth face. In particular, beam characteristics can be improved because the laser chip can be directed in the normal direction of the smooth face through the smooth transparent resin member (column 5, lines 13-18). Thus, if Tanaka were to be implemented such that the transparent resin material had a light diffusing capability, the coherence of Tanaka's semiconductor laser would be reduced (i.e., insuperior beam characteristics).

Andrews is relied on for teaching at least one additional semiconductor laser chip. Andrews is concerned with a method for producing closely spaced and aligned semiconductor laser chips. Andrews does not teach or suggest a resin encapsulating the semiconductor laser chips and forming a lens.

Thus, Andrews does not at least make up for the deficiencies of Tanaka with respect to an encapsulating resin. Therefore the rejection fails to establish prima facie obviousness for claims 6 and 9. Applicants respectfully request that the rejection be withdrawn.

Claim Rejections - 35 USC 103

Claim 11 has been rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka and Okuda (U.S. Patent 6,049,423). Claims 12 and 13 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka as applied to claim 1, in view of Andrews, Brooks et al., or Missaggia. Applicants respectfully traverse these rejections.

At least for the same reasons as above for claim 1, Applicants submit that *prima facie* obviousness has not been established for claims 11, 12, and 13.

Claims 14 and 15 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka and Claisse as applied to claim 4, and further in view of Hazell et al.

At least for the same reasons as above for claim 4, Applicants submit that *prima facie* obviousness has not been established for claims 14 and 15.

Applicants respectfully request that the rejections be withdrawn.

CONCLUSION

All objections and rejections raised in the Office Action having been addressed, it is respectfully submitted that the present application is in condition for allowance and such allowance is respectfully solicited. Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Robert W. Downs (Reg. No. 48,222), to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1. 17; particularly, extension of time fees.

Respectfully submitted,

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